論 文 要 旨 等 報 告 書

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学位論文題名	Effects of Scutellaria Baicalensis Georgi on Virulence Factors of Mutans Streptococci (齲蝕原性連鎖球菌の病原性要因に関するScutellaria baicalensis Georigi の影響)
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学 位 論 文 内 容 の 要 旨

【INTRODUCTION】

It is well known that *mutans streptococci* are the major etiological agents in dental caries; both *Streptococcus mutans* and *Streptococcus sobrinus* produce acids, and extra cellular glucans and fructans from sucrose, which are critical factors in the expression of virulence by these microorganisms. Hence, controlling *Streptococcus mutans* and/or inhibiting the growth and adherence of the *Streptococcus mutans*, dental plaque formation and the expression of the virulence factors can accomplish the prevention of dental caries. The numbers of antibacterial agents against *Streptococcus mutans* have been reported. In nature there are a large number of different types of antimicrobial compounds that play an important role in the natural defense of all kinds of living organisms. This study focused on *Scutellaria baicalensis Georgi*. *Scutellaria baicalensis Georgi* has been used for thousands of years in traditional Chinese medicine practice for several purposes. It possesses several biological activities such as anti-oxidative, anti-inflammatory, antibacterial and antiviral activities. Although the antibacterial activity of *Scutellaria baicalensis Georgi* has already been demonstrated, little is known about its antibacterial activity against oral pathogens in vitro. Therefore, the aim of this study is to evaluate the antibacterial activity by six different kinds of *Scutellaria baicalensis Georgi* extracts and effect on virulence factors of *Mutans Streptococci* in vitro.

[MATERIALS & METHODS]

In this study, the three kinds of bacterial strains were used as follows: *Streptococcus mutans* ATCC 25175, *Streptococcus sobrinus* ATCC 33478 and *Streptococcus salivarius* ATCC7073.an assay antibacterial activity of *Scutellaria baicalensis Georgi* extracts was done first. Followed by assays of inhibition growth, adherence, glycolysis, and glucan-binding lectin activity of *Streptococcus mutans*. Lastly, inhibition biofilms formation assay was done.

[RESULTS] In all the *Scutellaria baicalensis Georgi* solvent extracts, except for water and ethyl acetate, a significant inhibitory activity was observed. The acetone and 80% ethanol, and the ethanolic extracts showed higher activity than the methanol extracts and produced inhibition zones ranging from 7.11±0.18 to 14.79±1.02 mm in diameter diameter at a concentration of 750 μg/disk. The MIC value of the *Scutellaria baicalensis Georgi* extracts ranged from 125 to 1000μg/ml. The MBC values for different strains and extracts ranged from 250 to 2000μg/ml. In addition, sub-MIC levels of *Scutellaria baicalensis Georgi* extract significantly inhibited adherence to smooth surfaces; inhibited acid production ability, inhibited dextranT-2000 induced cellular aggregation, and inhibition of biofilms (dental plaque) formation in vitro.

[CONCLUSION] In conclusion, the results of the present study suggest that *Scutellaria baicalensis Georgi* can prevent dental caries, since it demonstrated significant antibacterial activity against the microorganisms involved in such disease and, especially, remarkable inhibitory activities against *mutans streptococci* growth and cell adherence at low concentrations, acid production ability, dextranT-2000 induced cellular aggregation, and dental plaque formation in vitro. Further studies should be conducted to examine whether these compounds alone or in combination have any influence on the viability, development and virulence of *mutans streptococci* biofilms. Research is in progress to evaluate these biological effects of *Scutellaria baicalensis Georgi* using in vivo models.

論文審査の結果の要旨

本研究は、中国で古くから抗炎症剤として用いられている漢方の一種である*Scutellaria baicalensis Georgi*のmutans streptococci に対する抗齲蝕原性（増殖阻止、付着活性やpH低下速度に及ぼす影響、glucan binding activity ならびにバイオフィルム形成に及ぼす影響）について調べたものである。

有効成分の抽出には80%エタノール、99%エタノール、メタノール、アセトンを用い、ネガティブコントロールとして蒸留水と１%DMSO、ポジティブコントロールとしてクロロヘキシジンを用いた。Mutans streptococciの標準菌株として、*Streptococcus mutans* ATCC25175、*Streptococcus sobrinus* ATCC33478と*Streptococcus saliva-rius* ATCC7073を用いた。抗齲蝕原性の分析にはtime-kill分析、付着活性分析、糖分解分析、glucan-binding活性分析、crystal violet分析を行った。

抽出量は80%エタノールが最も多く、蒸留水、99%エタノール、メタノール、アセトンの順であった。抽出物の供試菌に対する最小発育阻止濃度(MIC)と最小殺菌濃度(MBC)はアセトン抽出物がmutans stretococciに対して最も強く、80%エタノール、99%エタノール、メタノール、蒸留水抽出物の順で抗菌作用を示した。また、アセトン抽出物はmutans streptococciがもつスクロース依存性付着活性を最も強く阻害することが示された。アセトン抽出物の*S. mutans*の酸産成抑制能の阻害濃度はsub-MICレベルでも阻害が認められた。さらにバイオフィルムの形成阻止はアセトンと80%エタノールおよび蒸留水抽出物に認められたが、sub-MIC濃度ではアセトン抽出物が最も強い活性を示した。

本研究では、*Scutellaria baicalensis Georgi*の種々の抽出液による抽出量、ならびに抗齲蝕原性が論じられており、*Scutellaria baicalensis Georgi*歯科臨床の可能性を示した先駆的研究であり、十分に齲蝕予防の分野において貢献するものである。

したがって、本申請論文は博士（歯学）の学位授与に値するものと判断した。